



A STUDY OF FASTING PLASMA GLUCOSE, FASTING SERUM INSULIN AND FASTING SERUM INSULIN : FASTING PLASMA GLUCOSE RATIOS IN A GROUP OF RURAL, MISING POPULATION OF UPPER ASSAM.

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ABSTRACT A study of fasting plasma glucose, fasting serum insulin, fasting serum insulin : fasting plasma glucose levels was undertaken in a group of 124 hardworking, rural, tribal Mising population of Upper Assam with an aim to evaluate and analyse their glucose homeostasis in context of the present scenario of increasing cases of diabetes mellitus - gradually claiming to the status of an epidemic in India.

Time of study: Between Nov 2013 to April 2014.

Result : Fasting plasma glucose level , fasting serum insulin level and fasting serum insulin : fasting plasma glucose ratio, were all within normal reference ranges among the population studied. Values of fasting plasma glucose, fasting serum insulin were significantly lower ($p \leq 0.05$) among females (when compared with males) and cultivators (when compared with in service people). Ratios of fasting serum insulin : fasting plasma glucose were well within normal limits with no significant changes when compared according to sex or occupation.

The study highlights the role of socio-cultural life, economic status and regular physical labour in maintenance of proper biochemical profile of carbohydrate metabolism.

KEYWORDS : fasting glucose, fasting insulin, Mising.

Introduction :

Diabetes mellitus revolves around glucose and is the most alarming metabolic abnormality which has gained the status of a potential epidemic in India. According to the WHO, there were 31.7 million persons with diabetes mellitus in India in 2000 and number is likely to be increased upto 71.4 million in 2030 [1]. Prevalence of diabetes mellitus is predicted to double globally from 171 million in 2000 to 366 million in 2030 with the maximum increase in India [2].

The present study has been carried on the Misings- a group of colourful, indigenous, ethnic Mongloid tribal population inhabiting in the plains of the Brahmaputra valley of upper Assam. They have a unique socio-cultural and economic life. Most of the Mising live in rural areas. They are hardworking. Their economy is based on agriculture. Their staple food is rice and are non vegetarians. Till date, very little published datas are available on various biochemical parameters of the Mising community. Appreciating the unique genetic and socio-cultural identity of this group of population. The present study aims to evaluate their Fasting serum Insulin level, fasting plasma glucose level and fasting insulin to glucose ratio. This is an attempt to through some light on the metabolic status of glucose among the hardworking, rural Misings.

Materials and Methods :

Cases: 124 numbers of apparently healthy cases were randomly selected for the study from the Mising villages of Dhekorgora Block of Jorhat district between 40 years and 50 years of age. Known diabetics or people suffering from debilitating diseases were excluded from the study.

Time of study: The duration of study spread from Nov. 2013 to April 2014.

Sample collection: Overnight fasting venous blood samples were collected maintaining all aseptic precautions into two tubes as follows:

(a) 2 mL into a polystyrene tube of 25 mm × 75 mm size for the

estimation of insulin.

(b) 2 mL in NaF vials for plasma glucose estimation.

Estimations:

- (A) **For insulin :** Collected samples were kept at room temperature and allowed to clot. Centrifugation was done and serum was collected in separate vial and preserved at -20° C at the department of Microbiology , Jorhat Medical College , Jorhat. The sample collection of the entire study group was done in a span of three days. Particular care was taken to avoid denaturation of proteins in the samples- like, use of portable vaccine carriers for transportation. Finally, the samples were transferred to Subharti Medical College, Meerut by air and insulin was estimated in a ROBONIK ELISA washer and reader, using solid phase Sandwich ELISA diagnostic kits (EIA2935) from DRG, Germany, on the same day.
- (B) **For glucose :** Collected samples in NaF vials were centrifuged at 5000 rpm for 10 minutes and estimated for glucose concentration in Vitros 250 dry chemistry autoanalyser (ortho-clinical diagnostics – Johnson & Johnson).

Quality control :

In both the above estimations, adequate quality control exercises were undertaken.

Statistical analysis :

Done using SPSS version 16.

Results and Observations :

- (1) Table showing total number of cases and distribution according to sex and primary occupations.

Total number of cases	Sex		Occupation	
	Male	Female	Cultivation	Service
124	66	58	96	28

Number of male cases are little more than the number of female cases. Number of people engaged in cultivation grossly outnumbered the number of cases whose primary occupation is service.

(2) Table showing fasting plasma glucose, fasting serum insulin level and fasting serum insulin: fasting plasma glucose ratios among all the cases.

Total number of cases	Fasting plasma glucose level mg/dL	Fasting serum insulin level μ U/mL	Fasting serum insulin: fasting plasma glucose
124	80.95 \pm 9.11	9.19 \pm 2.59	0.112 \pm 0.022

(3) Table showing Fasting plasma glucose level (mean \pm SD) as per sex, occupation and the comparative P values.

Total number of cases	Fasting plasma glucose mg/dL					
	Sex			Occupation		
124	Male n = 66	Female n = 58	P value	Cultivation n = 96	Service n = 28	P value
	82.86 \pm 8.733	78.79 \pm 9.121	0.012	79.33 \pm 8.644	87.12 \pm 8.287	0.000

Observations :

- Fasting plasma glucose level in males were significantly higher than the females.
- Fasting plasma glucose levels were significantly higher among the service holders when compared with the cultivators.
- Table showing Fasting serum insulin level (mean \pm SD) as per sex, occupation and the comparative P values.

Total number of cases	Fasting serum insulin level μ U/mL					
	Sex			Occupation		
124	Male n = 66	Female n = 58	P value	Cultivation n = 96	Service n = 28	P value
	9.6430 \pm 2.97499	8.6957 \pm 1.98334	0.03	8.8018 \pm 2.12909	10.7004 \pm 3.54083	0.014

Observations :

- Fasting serum Insulin levels were found to be significantly low in females when compared with the males.
- Fasting serum insulin level among the service holders were also significantly found higher than the people who were cultivators.
- Table showing fasting serum insulin : fasting plasma glucose ratios as per sex, occupation and comparative P values.

Total number of cases	Fasting serum insulin : Fasting plasma glucose ratio					
	Sex			Occupation		
124	Male n = 66	Female n = 58	P value	Cultivation n = 96	Service n = 28	P value
	0.114 \pm 0.025	0.109 \pm .017	0.207	0.110206 \pm 0.018392	0.121 \pm 0.33	0.102

Observations :

Although fasting serum insulin: fasting plasma glucose ratio in males were slightly higher than the females but they were not significant enough ($p > 0.05$). Similarly values of in service group were more than the cultivators without being statistically significant ($p > 0.05$).

Discussion :

The worldwide prevalence of Type II diabetes mellitus is rising quite rapidly, presumably because of increasing obesity, reduced activity levels as countries become more industrialised and the aging of the population [3]. In light of the above context, the present study assumes importance because it was undertaken in a group of hardworking rural population with an agriculture based economy.

In our study, the mean fasting plasma glucose level was found to be 80.95 mg/dL \pm 9.11 mg/dL which reflects a very good blood glucose status of the studied population. This result thus obtained is similar to

the studies done before on the same community [4,5]. Males in our study showed statistically significant ($p < 0.05$) higher levels (82.86 mg/dL \pm 8.733mg/dL) than the females (78.79 mg/dL \pm 9.21 mg/dL).

Fasting serum insulin values of 9.19 μ U/mL \pm 2.59 μ U/mL was obtained among the whole population studied. This value is quite similar with the whole population studied. This value is quite similar with the fasting insulin levels found in other studies [4,5]. Thus, this fasting serum insulin level again re-affirms a good metabolic status of carbohydrates in the studied population. Almost similar to fasting plasma glucose levels (as above), the fasting serum insulin levels were also found to be significantly higher ($p \leq 0.05$) in males (9.6430 μ U/mL \pm 2.97499 μ U/mL) than the females (8.6957 μ U/mL \pm 1.98334 μ U/mL).

Eventhough, well within normal reference ranges, both fasting plasma glucose and fasting serum insulin levels were found to be significantly ($p \leq 0.05$) higher among the people in service (8.8018 μ U/mL \pm 2.1290 μ U/mL) for insulin and (87.12 mg/dL \pm 8.287 mg/dL) for glucose when compared with cultivators (8.8018 μ U/mL \pm 2.1290 μ U/mL) for insulin and (79.33 mg/dL \pm 8.644 mg/dL) for glucose.

There exists an inverse relationship between socio-economic status and prevalence of diabetes mellitus [6]. In our study, the population group in service were socio-economically better than their cultivator counterparts. The results being similar to other studies [4,5,7,8,9]. Socio-economically better, the inservice group, are not that hardworking as the cultivators. So, their fasting insulin and glucose levels were found to be higher. These results are also comparable to the inferences of other studies [10,11,12]. However, all the values were well within the lower side of normal reference ranges.

Fasting serum insulin: fasting plasma glucose ratio were also found to be well within the normal ranges ($ie \leq 0.4$). Both, sex or occupation wise, no significant changes were noticed. However, values were little higher in males, so was also with the people in service.

Conclusion :

Our study re-affirms that regular physical activity/ labour play a major role in overall glucose homeostasis.

There is definitely an element of scope for a more elaborate comparative study between the original rural inhabitants and the migrated urban Mising population on various biochemical parameters. This would through light and enrich our information stock specifically on the contributing factors leading to various non communicable diseases like DM, CAD or cancers.

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